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Scale Development and Validation to Measure Student's Perceived Impact of Learning and Satisfaction Towards e-Learning

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Abstract

The educational system across the world has greatly been affected due to outbreak of COVID-19; it forced the closure of educational institutions to prevent the spread of the virus. Due to that, all teaching and learning programmes should be conducted through online platform. Hence, the presence of e-learning, computer-based learning has emerged as closest substitute for off-line teaching. Thus, the purpose of this study is to establish a standardised measurement that engender satisfaction and positive impacts of e-learning. To develop and validate the scale, a sequential process is conducted which includes item generation, item purification and item validation. Relevant literature was reviewed and responses from 164 students of Universiti Teknologi MARA, Kelantan's Campus, Malaysia were collected through online questionnaire to explore the factor structure and to validate the scale. Confirmatory factor analysis (CFA) using SmartPLS (version 3.3.3) was used to validate the scale. The findings of the study recommend the extension of the scale development and validation used in this research for future research. The findings of the study will facilitate educational institutions and policy makers to take this online-learning process to the next level in a better way.

Keywords*: COVID-19; Classroom Learning; e-Learning; Perceived Impact; Satisfaction*

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INTRODUCTION

Innovation in the learning delivery methods have changed because of technological advancements in educational delivery systems. The advancement of information and communication technologies (ICT) have led in a new learning paradigm known as online learning, e-learning (Azizan, 2010). Malaysia's higher education system undergoing a comprehensive transformation over the years by revamping the curriculum and teaching methods with new critical elements to embrace opportunities within the gig economy and fulfil the needs of the markets and industries. As in 2019, a total of 1,325,699 students in the higher education institutions (HEIs) in Malaysia that consist of 51 percent in the private HEIs. Currently, there are over 400 private HEIs and 20 public universities in Malaysia. E-learning is a technology trend that allows for lifelong learning and require digital proficiency. Among the earliest e-learning institutions established over the years are Open University Malaysia (OUM), Wawasan Open University (WOU), GlobalNxt University, Asia E-University, Veritas University College, UNITAR International University, Universiti Tun Abdul Razak (UNIRAZAK), Al-Madinah International University (MEDIU) and Genovasi University College. However, the unprecedented outbreak of the COVID-19 pandemic

has contributed to the rise of e-learning, and it denotes as a jump-started to implement e-learning in the HEIs. The HEIs have initiated the e-learning approaches known as Open and Distance Learning (ODL) practices in response to the new normal resulting from the pandemic. Therefore, both private HEIs and premier public universities in Malaysia are implementing the e-learning for the sustainable learning process during this pandemic (BERNAMA, 2021). The COVID-19 pandemic has change the way of life all the people in the world. Qamar and Bawany (2021) found that teachers and students were reluctant to accept the e-learning as a new mode of learning methods because of minimum or no training and limited access to the computing devices and internet connections. Both students and teachers have found the transition from the traditional classrooms to virtual environments to be difficult. Further, the e-learning implementation is hampered by issues such as inadequate Internet connection, income disparity, and even a lack of technical expertise (Alenezi et al., 2021). Hence, the studies on the satisfaction towards e-learning is important for providing the best possible educational delivery outcomes to the learners and instructors. It is also important to overcome the challenges of e-learning faced by the higher institutions. This study is aimed to establish a standardised measurement that engender satisfaction and positive impacts of E-learning.

LITERATURE REVIEW

To gain deeper understanding of the phenomenon, a wide range of literature has been reviewed. Relevant papers were downloaded from different data bases such as Science Direct, Emerald, Elsevier and Taylor and Francis. The keywords used to search the relevant articles include “e-learning”, “perceived impact on learning” and “satisfaction”. Reviewing relevant literature assisted to define the construct and to understand its domain and possible dimensions.

Past Studies Across e-Learning for Education System

The e-learning research are continuously growing in numbers in the various field of studies. The researchers worldwide are interested in the e-learning studies due to the development education system and support Industrial Revolution 4.0. Since the beginning of the 21st century, different research disciplines have disclosed information about multiple and discrete elements of e-learning, thus provide the future insights for

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the future studies. Consequently, the e-learning become growing and significant to be studied.

The extensive of the e-learning literatures emphasized on different perspectives such as education tools, learning issues in the education fields, students behavioural towards e-learning and usability. The literatures on the education technology trends showing that a lot of technology or tools used in the e-learning process. The past studies showed that gamification widely used to support e-learning process in the education system (De-Marcos, Domínguez, Saenz-de-Navarrete, & Pagés, 2014; Merchant, Goetz, Cifuentes, Keeney-Kennicutt, & Davis, 2014; Urh, Vukovic, & Jereb, 2015). Besides, the mobile learning is among the technology used for e-learning (Ally & Prieto-Blázquez, 2014; Baran, 2014; Mehdipour & Zerehkafi, 2013). The cloud computing is adopted to transform e-learning into a flexible, shareable, and content-usable (Wang et al., 2019; Bora & Ahmed, 2013; Ghazizadeh, 2012;). Apart from that, the usage of the most common social media applications installed in the digital devices such as Facebook, Youtube, chatting apps, etc are preferable e-learning methods by both instructors and learners (Brady, Holcomb, & Smith, 2010; Cheston, Flickinger, & Chisolm, 2013; Kassens-Noor, 2012).

The health education responses towards the globalization through the innovation of online learning. Adopting e-learning for health education could be of great benefit for targeting good health and well-being and quality education (Barteit et al., 2020; Liu et al., 2016; Button, Harrington & Belan, 2014). Moreover, Massive Open Online Courses (MOOCs) have been used as a part of e-learning and blended learning in the higher education (Feitosa de Moura et al., 2021; Littenberg-Tobias & Reich, 2020; Clarà & Barberà, 2013; Knox, 2014).

As a result, the literatures proved that the e-learning is seen to be very flexible for various study fields. The e-learning are still relevant and significant to be studied because of the rapid development of technology and to sustain the learning process in the education systems. Besides, the e-learning able to sustain the lifelong learning process and catalyst of the development in the technology as well as to cope with unforeseen circumstances.

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Hwang and Kim (2022) studied the factors that contribute to the e-learning satisfaction. The findings found that e-Learning Satisfaction Scale (eLSS) develop in the study is reliable by using several analyses such as exploratory factor analysis, convergent validity and internal consistency reliability. The eLSS comprises of three factors namely; content, interface and communication is used to investigate the experience and effectiveness of e-learning.

The e-learning satisfaction can be evaluated through the learners' accessibility to the learning contents. The usability of the system or technology used can affect the student's satisfaction. Besides, the interface of the system led to the intention to use e-learning system. The active communication between instructor and learner by sharing the educational contents can affect the satisfaction (Al-Adwan et al., 2021; Al-Balas et al., 2020; Fryer et al., 2020; Hwang & Kim, 2022). According to Yekefallah et al. (2021), the ease of use and usability of the e-learning technology significantly influence the satisfaction. The usefulness not only important but critical to determine the satisfaction of e-learning (Ngah et al., 2022; Roca et al., 2006). This is because the unsound environment such as the learners and instructors not familiar with the technology used will contribute to the dissatisfaction of e-learning (Roca et al., 2006; Yawson & Yamoah, 2020; Yekefallah et al., 2021).

The adequate e-learning support systems in term of training, facilities and environment are important to ensure smooth teaching and learning process. Yawson and Yamoah (2020) studied on the generation types and the e-learning satisfaction. The study supported that the e-learning environment affect the satisfaction among different types of generation. Besides the supportive environment provided by the institutions, the technical support is important to ensure that the e-learning systems and technologies can be utilized by both instructors and learners (Ngah et al., 2022).

Most of the literatures discussed on the e-learning system quality as the contributing factors of e-learning satisfaction. However, the instructors quality is one of the determining factors of e-learning satisfaction (Khalid & Boubker, 2022; Roca et al., 2006; Yawson & Yamoah, 2020; Yekefallah et al., 2021). It proved that role of instructors and students are vital in determining the e-learning satisfaction (Khalid & Boubker, 2022). The quality instructors play important roles to influence the learner's

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satisfaction towards e-learning. The quality instructors can be determined by understand and familiar in handling the e-learning system or technology.

FRAMEWORK DEVELOPMENT

Technology Acceptance Model (TAM) Perspective of e-Learning

The landscape of the learning in the education system is changed from the conventional method, face to face learning, then towards the mixed of online and face to face known as blended learning. Starting in the year of 2020, the learning landscapes are totally twist 360 degrees due to the outbreak of pandemic COVID-19 through the implementation of e-learning in all levels of education system. The COVID-19 has spread globally and consequently the higher education institution has moved to online learning (Oyediran et al., 2020; Patricia Aguilera-Hermida, 2020; Sukendro et al., 2020). Nugroho et al. (2019) stated that the e-learning as an enabler to access the learning materials conveniently. The education institutions adopting the e-learning to facilitate the instructors in the teaching and learning process by integrating the information technology and communication (ICT) in the teaching and learning process may facilitate the learning process and enrich the learning materials to the students.

The e-learning has been identified as a required intervention to cushion the impact of the global pandemic, COVID-19, and as well rapid development of ICT for rapid growth and development in the education system. The advantages of e-learning include wide coverage, cost-effectiveness (Barteit et al., 2020; Patricia Aguilera-Hermida, 2020), uniformity, fast teaching and learning process (Oyediran et al., 2020). However, the studies found out the challenges faced by both students and instructors. Some of the challenges identified from the literatures are limited or no internet accessibility (Azlan et al., 2020; Ibrahim et al., 2021) and facilities to support e-learning, health conditions (Azlan et al., 2020; Hasan & Bao, 2020), design of class such as duration and student's interaction (Azlan et al., 2020; Kacetl & Semradova, 2020; Singh et al., 2021).

There are various theoretical models have been developed by the previous scholars namely theory of reasoned action, the technology acceptance model, the theory of planned behaviour, the motivational model, and self-efficacy theory in understanding the contributing factors of information technology and user's behaviour toward the

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information technologies. Among the models, TAM has widely-used and reported in the social science studies (George Saadé et al., 2007; Ifinedo, 2017; Patricia Aguilera-Hermida, 2020; Sukendro et al., 2020). Therefore, this study is adapted from the previous studies done by Ifinedo (2017). The study is based on technology acceptance model (TAM) and which has been extended and applied to different information technologies, work environments, and end-users. The innovation diffusion theory (IDT), expectation-confirmation model (ECM) and flow theory are integrated in the framework for this study. Based on the previous study, perceived enjoyment, compatibility, usefulness, ease of use, and confirmation have positive impact on the students satisfaction with blogs use for learning, and perceived impact of blogs on learning outcomes (Baber, 2021; Bernama, 2021; Ifinedo, 2017; Sukendro et al., 2020).

Davis suggests in the TAM that perceived ease of use (PEU) and perceived usefulness (PU), mediate the influence of other variables on the technology acceptance (George Saadé et al., 2007). The TAM identified that the perceived usefulness and perceived ease of use predicted the behaviour of the users towards adopting the technology. It deals with the attitude and user's feeling either positive or negative, towards that behaviour so-called adopting the systems or technologies (Sukendro et al., 2020).

Furthermore, the satisfaction is an important determinant for the e-learning. The usability of the system and web quality significantly affected the user's satisfaction on e-learning (Baturay, 2010) Expectation Confirmation Theory theorized that satisfaction with a service had positive effects on future intention (Oliver, 1980). Chang, 2013 and DeLone & McLean (2003) proved that the satisfaction determines users' continuance intentions of the e-learning systems. Therefore, the satisfaction has been widely adopted as an important factor of the system.

RESEARCH METHODOLOGY

Scale Development

This study followed the systematic scale development approach (Churchill,1979; Netemeyer et al., 2003) to develop a perceived impact of learning and satisfaction scale. This included (1) item generation, (2) item purification and (3) item

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validation and reliability assessment. Figure 1 provides a graphical representation of this process.

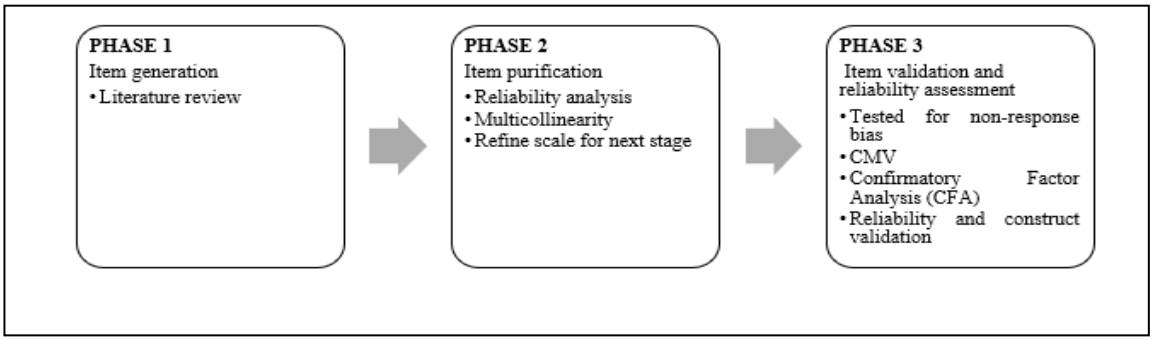

Figure 1: *Scale Development Process*

Phase 1: Item Generation

A thorough examination of the literature on perceived impact of learning and satisfaction was conducted. an initial pool of agree-disagree items was generated. The review process involved a number of items from past measurements of the research.

Phase 2: Item Purification

The data collection was made by distributing the questionnaires online to students' of UiTM Kelantan's campus. Using convenience sampling, the students were randomly approached, where they were administered by their lecturer during the online class for first semester of online classes that were conducted during COVID-19 pandemic. Altogether, 164 responses were deemed appropriate and complete for the purpose of this study. They were asked to assess their feelings toward impacts and satisfaction on E-learning on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree).

Phase 3: Item Validation and Reliability Assessment

To further verify the constructs identified in Phase 2, reliability and construct validation techniques were employed to assess the scale items measuring the impact and satisfaction's construct (Ifinedo, 2017). Item validation and reliability assessment were used to test the convergent, discriminate, and predictive validity of the scale.

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RESULT AND DISCUSSION

This study followed the systematic scale development approach [1] [2] to develop a host sincerity scale. This included (1) item generation, (2) item purification and (3) item validation and reliability assessment. Figure 1 provides a graphical representation of this process.

Results of Phase 2: Item Purification

A total of 164 respondents took part in this study. Majority of the respondents are female indicated 85.4 percent and 14.6 percent is male. The normality, multicollinearity and common method variance are discussed in the Table 1.

Table 1: *Normality Test*

Variables	Normality Test		Multicollinearity	
	Skewness	Kurtosis	Tolerance	VIF
Perceived Compatibility	-.260	.544	.188	5.306
Perceived Ease of Use	-.292	-.637	.135	7.422
Perceived Usefulness	-.417	.223	.106	9.453
Satisfaction	-.621	.304	.120	8.329
Perceived Impact on Learning	-.372	-.250		
Perceived Enjoyment	-.492	.041	.0.90	11.146
Confirmation	-.469	.133	.106	9.314

The analyses showed that all the construct variables, perceived compatibility, perceived ease of use, perceived usefulness, satisfaction, perceived impact on learning, and confirmation, are normally distributed based on the value of skewness and kurtosis. The skewness and kurtosis of all the variable are between -1 and +1. The skewness values ranged from -0.260 to 0-0.21 and kurtosis values ranged from -0.637 to 0.544 respectively. However, the perceived enjoyment is not normally distributed because the kurtosis value is below than 1 indicated 0.041. To assess the assumption of multicollinearity, the value tolerance and VIF is below than 10 for perceived compatibility, perceived ease of use, perceived usefulness, perceived impact on learning, and confirmation ranging between 5.306 and 9.314. However, the perceived enjoyment indicates a serious problem because the value of VIF is greater than 10 (11.146) and tolerance is below than .1 indicates a serious problem for this variable (Field, 2009).

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Results of Phase 3: Item Validation and Reliability Assessment

Prior to assessing construct validity, non-response bias was tested. Non-response bias occurs when the number of respondents who responded to the questionnaire is significantly different from the number of respondents who did not respond in terms of demography and their perception towards the (Chye, 2004). As the respondents were from similar type of professions, the non-response bias was expected to be minimal (Chye, 2004). However, in this study, there is no early and late response groups since the data collection was completed in a short time of period. Moreover, non-response bias is not expected when a convenience sampling was utilised in the study (Hulland, 2018). Additionally, the occurrence of Common Method Variance (CMV) was tested. CMV refers to variance attributed to the measurement method rather than variance explained by the variables of the study. The Harman single-factor test was used to address this problem (Podsakoff, MacKenzie, Lee & Podaskoff, 2003). The main idea of this technique is that if CMV exists, one factor is likely to explain the majority of variance.

Reliability Test

The analysis for convergent validity can be carried out by examining the significance of outer loading of indicators and the average variance extracted (AVE) for each measure. Convergent validity can be established using Partial Least Squares Structural Equation Modeling (PLS-SEM) by discovering the higher outer loadings. It is applied to the first-order reflective construct. Under the reflective measurement model, two types of validity are assessed: 1) Convergent Validity and 2) Discriminant Validity. Convergent validity is the degree to which indicators of a specific construct converge or share a high proportion of variance in common (Hair, Black, Babin, Anderson & Tatham, 2010). As suggested by Hair, Hult, Ringle and Sarstedt (2017), factor loadings and AVE are used to assess convergent validity. The presentation of results is shown in Table 2.

The indicator loadings, CR and AVE of the reflective constructs are shown in Table 2. All the loadings which exceed the recommended value of 0.708 (Hair et al., 2017) are retained. All the seven constructs meet the threshold values for CR and AVE, where all CRs are greater than 0.7 and all AVEs are greater than 0.5 (Hair et al., 2017). It is concluded that the constructs meet reliability and convergent validity requirement at this stage.

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Table 2: *Measurement Model*

Construct	Items	Loadings	AVE	CR
Perceived Compatibility	B1	0.946	0.899	0.973
	B2	0.945		
	B3	0.959		
	B4	0.944		
Perceived Ease of Use	C1	0.902	0.876	0.966
	C2	0.937		
	C3	0.952		
	C4	0.952		
Perceived Usefulness	D1	0.954	0.864	0.962
	D2	0.952		
	D3	0.933		
	D4	0.877		
Satisfaction	E1	0.962	0.919	0.983
	E2	0.953		
	E3	0.959		
	E4	0.966		
	E5	0.954		
Perceived Impact on Learning	F1	0.979	0.940	0.979
	F2	0.966		
	F3	0.964		
Perceived Enjoyment	G1	0.961	0.921	0.983
	G2	0.958		
	G3	0.953		
	G4	0.961		
	G5	0.965		
Confirmation	H1	0.874	0.870	0.964
	H2	0.945		
	H3	0.951		
	H4	0.958		

Subsequently, discriminant validity of the model is assessed based on HTMT inference developed by (Henseler, Ringle & Sarstedt, 2015). Table 3 indicates that there

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is discriminant validity between all the constructs where all indicators are highly loaded on their respective constructs. In other words, there is no issue of high cross-loading among one another. The result of HTMT inference shows that the confidence interval does not show a value of 1 on any of the constructs (Henseler et al., 2015), which also confirms discriminant validity.

Table 3: *Discriminant Validity using HTMT*

	Confirmation	PC	PEoU	PE	PIoL	PU
Perceived Compatibility (PC)	0.857					
Perceived Ease of Use (PEoU)	0.917	0.912				
Perceived Enjoyment (PE)	0.965	0.845	0.927			
Perceived Impact on Learning (PIoL)	0.955	0.871	0.929	0.965		
Perceived Usefulness (PU)	0.945	0.922	0.947	0.948	0.981	
Satisfaction	0.940	0.805	0.923	0.930	0.929	0.917

Table 4 depicts a method of discriminant analysis by means of comparing the cross loadings between constructs. Using the cross loadings to assess discriminant validity, it is important to note that each indicator should load high on its own constructs but low on other constructs. As indicated in the table, all indicators load high on its own constructs but low on other constructs. This indicates discriminants validity is achieved as the constructs are distinctly differ from each other.

Table 4: *Discriminant Validity using Cross Loadings*

	Confirmation	Perceived Compatibility	Perceived Ease of Use	Perceived Enjoyment	Perceived Impact on Learning	Perceived Usefulness	Satisfaction
B1	0.793	**0.946**	0.836	0.786	0.779	0.811	0.741
B2	0.754	**0.945**	0.798	0.758	0.774	0.816	0.696
B3	0.761	**0.959**	0.817	0.757	0.790	0.838	0.724
B4	0.804	**0.944**	0.864	0.810	0.848	0.877	0.803
C1	0.803	0.873	**0.902**	0.812	0.823	0.852	0.773
C2	0.804	0.766	**0.937**	0.845	0.831	0.822	0.823
C3	0.850	0.823	**0.952**	0.839	0.836	0.845	0.876
C4	0.815	0.812	**0.952**	0.853	0.849	0.847	0.863
D1	0.844	0.846	0.851	0.870	0.903	**0.954**	0.823
D2	0.839	0.842	0.839	0.865	0.886	**0.952**	0.798
D3	0.867	0.840	0.854	0.859	0.903	**0.933**	0.871

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D4	0.782	0.745	0.799	0.796	0.799	**0.877**	0.786
E1	0.844	0.734	0.874	0.860	0.865	0.848	**0.962**
E2	0.872	0.752	0.843	0.879	0.864	0.840	**0.953**
E3	0.877	0.741	0.857	0.879	0.850	0.842	**0.959**
E4	0.886	0.778	0.843	0.872	0.870	0.854	**0.966**
E5	0.876	0.747	0.855	0.874	0.885	0.845	**0.954**
F1	0.896	0.828	0.867	0.919	**0.979**	0.930	0.876
F2	0.872	0.798	0.861	0.889	**0.966**	0.897	0.880
F3	0.899	0.824	0.867	0.925	**0.964**	0.906	0.873
G1	0.898	0.801	0.876	**0.961**	0.933	0.903	0.886
G2	0.878	0.788	0.865	**0.958**	0.886	0.861	0.874
G3	0.888	0.795	0.844	**0.953**	0.894	0.886	0.848
G4	0.908	0.768	0.866	**0.961**	0.899	0.876	0.888
G5	0.902	0.786	0.841	**0.965**	0.897	0.853	0.871
H1	**0.874**	0.705	0.722	0.774	0.784	0.774	0.733
H2	**0.945**	0.787	0.830	0.886	0.871	0.848	0.872
H3	**0.951**	0.778	0.860	0.902	0.877	0.865	0.905
H4	**0.958**	0.789	0.841	0.909	0.884	0.856	0.869

CONCLUSION

The main objective of this study is to establish a standardised measurement of students' perceived impact of learning and satisfaction towards e-learning. Hence, the determinants of perceived compatibility, perceived ease of use, perceived usefulness, perceived enjoyment, and confirmation are identified. PLS Algorithm was applied in analysing the quantitative data. The results satisfy the first measurement that highlight the relationship between the determinants and perceived impact of learning and satisfaction. The technology-related factors are among the factors that contribute toward the satisfaction with online learning such as user-friendliness of the system (Elshami et al., 2021; Wingo et al., 2017). The e-learning is proved to be helpful and practical teaching instruments for the curriculum delivery during the COVID-19 pandemic. Besides, the student enjoyment in experiencing the online learning has been connected to effective communication and flexibility provided by the e-learning such as use of technology and compatibility and led to the satisfaction (Alenezi et al., 2021). Nugroho et al. (2019) found that the perceived impact plays an important role towards the

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satisfaction of e-learning. The determinants as suggested in this study can be further investigated for the future analyses to identify the student's satisfaction towards e-learning platform used to support the virtual environment of the learning process.

References

Ally, M., & Prieto-Blázquez, J. (2014). What is the Future of Mobile Learning in Education? *International Journal of Educational Technology in Higher Education*, 11(1), 142–151.

Al-Adwan, A. S., Albelbisi, N. A., Hujran, O., Al-Rahmi, W. M., & Alkhalifah, A. (2021). Developing a Holistic Success Model for Sustainable e-Learning: A Structural Equation Modeling Approach. *Sustainability (Switzerland)*, *13*(16), 1–25. https://doi.org/10.3390/su13169453.

Al-Balas, M., Al-Balas, H. I., Jaber, H. M., Obeidat, K., Al-Balas, H., Aborajooh, E. A., Al-Taher, R., & Al-Balas, B. (2020). Correction to: Distance Learning in Clinical Medical Education Amid Covid-19 Pandemic in Jordan: Current Situation, Challenges, and Perspectives, *BMC Medical Education*, (2020), 20, 1, (341), 10.1186/s12909-020-02257-4). *BMC Medical Education*, *20*(1), 1–7. https://doi.org/10.1186/s12909-020-02428-3.

Alenezi, M., Altwaiji, M., & Sanjalawe, Y. (2021). Does Online Education Support High Impact Educational Practices (HIEPs)? *International Journal of Educational Sciences*, *32*(1–3), 120–136. https://doi.org/10.31901/24566322.2021/32.1-3.1176.

Azizan, F. Z. (2010). Blended Learning in Higher Education Institution in Malaysia. *Proceedings of Regional Conference on Knowledge Integration in ICT 2010*, *8*(5), 55.

Azlan, C. A., Wong, J. H. D., Tan, L. K., A.D. Huri, M. S. N., Ung, N. M., Pallath, V., Tan, C. P. L., Yeong, C. H., & Ng, K. H. (2020). Teaching and Learning of Postgraduate Medical Physics Using Internet-based e-Learning during the COVID-19 Pandemic – A Case Study from Malaysia. *Physica Medica*, *80*, 10–16. https://doi.org/https://doi.org/10.1016/j.ejmp.2020.10.002.

Baber, H. (2021). Modelling the Acceptance of e-Learning during the Pandemic of Covid-19- A Study of South Korea. *International Journal of Management Education*, *19*(2), 100503. https://doi.org/10.1016/j.ijme.2021.100503.

eISSN 2600-9374

Barteit, S., Guzek, D., Jahn, A., Bärnighausen, T., Jorge, M. M., & Neuhann, F. (2020). Evaluation of e-learning for Medical Education in Low and Middle Income Countries: A Systematic Review. *Computers and Education*, *145*(September 2018). https://doi.org/10.1016/j.compedu.2019.103726.

Bernama. (2021, January 9). KKM Saran Pergerakan Rentas Daerah, Negeri Diperketat Jika Kes Covid-19 Terus Meningkat. *Bernama*. https://www.bernama.com/bm/am/news.php?id=1920162.

Bernama. (2021). *Evolution of e-Learning in the Malaysian Higher Education Institutions*. Malaysian Investment Development Authority. https://www.mida.gov.my/mida-news/evolution-of-e-learning-in-the-malaysian-higher-education-institutions/.

Chang, C. C. (2013). Exploring the Determinants of e-learning Systems Continuance Intention in Academic Libraries. *Library Management*, *34*(1), 40–55. https://doi.org/10.1108/01435121311298261.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten Year Update. *Journal of Management Information Systems*, *19*(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748.

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction With Online Learning in the New Normal: Perspective of Students and Faculty at Medical and Health Sciences Colleges. *Medical Education Online*, *26*(1). https://doi.org/10.1080/10872981.2021.1920090.

Feitosa de Moura, V., Alexandre de Souza, C., & Noronha Viana, A. B. (2021). The Use of Massive Open Online Courses (MOOCs) in Blended Learning Courses and the Functional Value Perceived by Students. *Computers and Education*, *161*(October 2020). https://doi.org/10.1016/j.compedu.2020.104077.

Fryer, K., Delgado, A., Foti, T., Reid, C. N., & Marshall, J. (2020). Implementation of Obstetric Telehealth during Covid-19 and Beyond. *Maternal and Child Health Journal*, *24*(9), 1104–1110. https://doi.org/10.1007/s10995-020-02967-7.

George Saadé, R., Nebebe, F., & Tan, W. (2007). Viability of the "Technology Acceptance Model" in Multimedia Learning Environments: A Comparative Study. *Interdisciplinary Journal of E-Skills and Lifelong Learning*, *3*, 175–184. https://doi.org/10.28945/392.

Hasan, N., & Bao, Y. (2020). Impact of "e-Learning Crack-Up" Perception on Psychological Distress among College Students during Covid-19 Pandemic: A Mediating Role of "Fear of Academic Year Loss." *Children and Youth*

eISSN 2600-9374

Services Review, *118*, 105355. https://doi.org/https://doi.org/10.1016/j.childyouth.2020.105355.

Hwang, S., & Kim, H. K. (2022). Development and Validation of the e-learning satisfaction Scale (eLSS). *Teaching and Learning in Nursing*, *000*, 1–7. https://doi.org/10.1016/j.teln.2022.02.004.

Ibrahim, N. K., Al Raddadi, R., AlDarmasi, M., Al Ghamdi, A., Gaddoury, M., AlBar, H. M., & Ramadan, I. K. (2021). Medical students' acceptance and perceptions of e-learning during the Covid-19 closure time in King Abdulaziz University, Jeddah. *Journal of Infection and Public Health*, *14*(1), 17–23. https://doi.org/10.1016/j.jiph.2020.11.007.

Ifinedo, P. (2017). Students' Perceived Impact of Learning and Satisfaction with Blogs. *International Journal of Information and Learning Technology*, *34*(4), 322–337. https://doi.org/10.1108/IJILT-12-2016-0059.

Kacetl, J., & Semradova, I. (2020). Reflection on Blended Learning and e-learning - Case Study. *Procedia Computer Science*, *176*, 1322–1327. https://doi.org/10.1016/j.procs.2020.09.141.

Khalid, C., & Boubker, O. (2022). *Evaluation of e-Learning System during the Covid-19 Pandemic in Morocco: A Partial Least Squares Modeling Approach Social CRM View project Pratiques Knowldge Management View project Abdelaziz Ouajdouni ENCG de Tanger*. *12*(6). https://doi.org/10.18178/ijiet.2022.12.6.1646.

Liu, Q., Peng, W., Zhang, F., Hu, R., Li, Y., & Yan, W. (2016). The Effectiveness of Blended Learning in Health Professions: Systematic Review and Meta-Analysis. *J Med Internet Res*, *18*(1), e2. https://doi.org/10.2196/jmir.4807.

Ngah, A. H., Kamalrulzaman, N. I., Mohamad, M. F. H., Rashid, R. A., Harun, N. O., Ariffin, N. A., & Osman, N. A. A. (2022). The sequential Mediation Model of Students' Willingness to Continue Online Learning during the COVID-19 Pandemic. *Research and Practice in Technology Enhanced Learning*, *17*(1). https://doi.org/10.1186/s41039-022-00188-w.

Nugroho, M. A., Setyorini, D., & Novitasari, B. T. (2019). The Role of Satisfaction on Perceived Value and e-Learning usage Continuity Relationship. *Procedia Computer Science*, *161*, 82–89. https://doi.org/10.1016/j.procs.2019.11.102.

Oyediran, W. O., Omoare, A. M., Owoyemi, M. A., Adejobi, A. O., & Fasasi, R. B. (2020). Prospects and Limitations of e-Learning Application in Private Tertiary Institutions Amidst COVID-19 Lockdown in Nigeria. *Heliyon*, *6*(11). https://doi.org/10.1016/j.heliyon.2020.e05457.

eISSN 2600-9374

Patricia Aguilera-Hermida, A. (2020). College Students' Use and Acceptance of Emergency Online Learning due to COVID-19. *International Journal of Educational Research Open*, *1*(July), 100011. https://doi.org/10.1016/j.ijedro.2020.100011.

Qamar, T., & Bawany, N. Z. (2021). Impact of COVID-19 on Higher Education in Pakistan: An Exploratory Study. *Ijeri-International Journal of Educational Research and Innovation*, *15*, 503–518. https://doi.org/10.46661/ijeri.5645.

Roca, J. C., Chiu, C. M., & Martínez, F. J. (2006). Understanding e-Learning Continuance Intention: An Extension of the Technology Acceptance Model. *International Journal of Human Computer Studies*, *64*(8), 683–696. https://doi.org/10.1016/j.ijhcs.2006.01.003.

Singh, H. K., Joshi, A., Malepati, R. N., Najeeb, S., Balakrishna, P., Pannerselvam, N. K., Singh, Y. K., & Ganne, P. (2021). A Survey of e-Learning Methods in Nursing and Medical Education during COVID-19 Pandemic in India. *Nurse Education Today*, *99*(February). https://doi.org/10.1016/j.nedt.2021.104796.

Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahruddin, S., Makadada, F. A., & Hakim, H. (2020). Using an Extended Technology Acceptance Model to understand students' use of e-Learning during Covid-19: Indonesian Sport Science Education Context. *Heliyon*, *6*(11), e05410. https://doi.org/10.1016/j.heliyon.2020.e05410.

Wingo, N. P., Ivankova, N. V., & Moss, J. A. (2017). Faculty Perceptions about Teaching Online: Exploring the Literature Using the Technology Acceptance Model as an Organizing Framework. *Online Learning Journal*, *21*(1), 15–35. https://doi.org/10.10.24059/olj.v21i1.761.

Yawson, D. E., & Yamoah, F. A. (2020). Understanding Satisfaction Essentials of e-Learning in Higher Education: A Multi-Generational Cohort Perspective. *Heliyon*, *6*(11), e05519. https://doi.org/10.1016/j.heliyon.2020.e05519.

Yekefallah, L., Namdar, P., Panahi, R., & Dehghankar, L. (2021). Factors Related to Students' Satisfaction with Holding e-Learning during the Covid-19 Pandemic Based on the Dimensions of e-Learning. *Heliyon*, *7*(7), e07628. https://doi.org/10.1016/j.heliyon.2021.e07628.

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